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A new species of *Coccomyces* (*Rhytismatales*, *Ascomycota*) from Mt Huangshan, ChinaGUO-JUN JIA¹, YING-REN LIN^{2*} & CHENG-LIN HOU³

¹ School of Life Science & ² School of Forestry & Landscape Architecture,
Anhui Agricultural University, West Changjiang Road 130, Hefei, Anhui 230036, China

³ College of Life Science, Capital Normal University,
Xisanhuanbeilu 105, Haidian, Beijing 100048, China

*CORRESPONDENCE TO: yingrenlin@yahoo.com

ABSTRACT—A fungus found on leaves of *Osmanthus fragrans* from Mt Huangshan in Anhui Province, China, is described as *Coccomyces minimus*. The new species is similar to *C. cyclobalanopsis* but differs in the extremely small, subepidermal ascomata and in the presence of conidiomata. The type specimen is deposited in the Forest Fungi Dried Reference Collection of Anhui Agricultural University, China (AAUF). Both illustration and comments accompany the description.

KEY WORDS—taxonomy, *Rhytismataceae*, *Oleaceae*

Introduction

Coccomyces De Not. is the second-largest genus in the *Rhytismataceae* (*Rhytismatales*, *Leotiomycetes*, *Ascomycota*) (Kirk et al. 2008). Members of this genus are characterized by polygonal to more or less circular ascomata opening by several radiate or irregular splits, cylindrical to clavate asci, and filiform to fusiform ascospores, often with gelatinous sheaths (Sherwood 1980; Cannon & Minter 1986; Johnston 1986, 2000; Spooner 1990; Lin et al. 1994).

Of the 116 *Coccomyces* species known worldwide (Kirk et al. 2008), 23 have been reported from China (Korf & Zhuang 1985; Lin 1998; Hou et al. 2006, 2007). They are widely distributed and inhabit leaves, twigs, bark, or wood of vascular plants, especially *Ericaceae*, *Fagaceae*, and *Lauraceae* (Sherwood 1980). Some species, such as *C. guizhouensis* Y.R. Lin & B.F. Hu, *C. ledi* Rehm, *C. leptideus* (Fr.) B. Erikss., *C. strobili* J. Reid & Cain, and *C. vilis* Syd. et al., may cause plant disease of economic significance (Lin et al. 1994, Rehm 1913, Sherwood 1980, Reid & Cain 1961, Cannon & Minter 1984).

In the present paper, *C. minimus* on leaves of *Osmanthus fragrans* (Thunb.) Lour. (*Oleaceae*) from Mt Huangshan in Anhui Province, China, is described as a new species.

Materials & methods

Pieces of plant material bearing fruit bodies containing asci and ascospores were selected. Sections of the fruitbodies 10–15 µm thick were cut using a freezing microtome and mounted in water, Melzer's reagent, 5% KOH, or 0.1% (w/v) cotton blue in lactic acid for microscopical observation. Gelatinous sheaths surrounding ascospores and paraphyses were observed in water or cotton blue in lactic acid. Measurements were made using material mounted in 5% KOH or Melzer's reagent from more than 20 ascospores, asci and paraphyses per ascoma. Point and line integrated illustrations of external shapes and internal structures of fruit bodies were prepared using a microscope drawing device.

Taxonomy

Coccomyces minimus Y.R. Lin, C.L. Hou & G.J. Jia, sp. nov.

FIGS. 1–7

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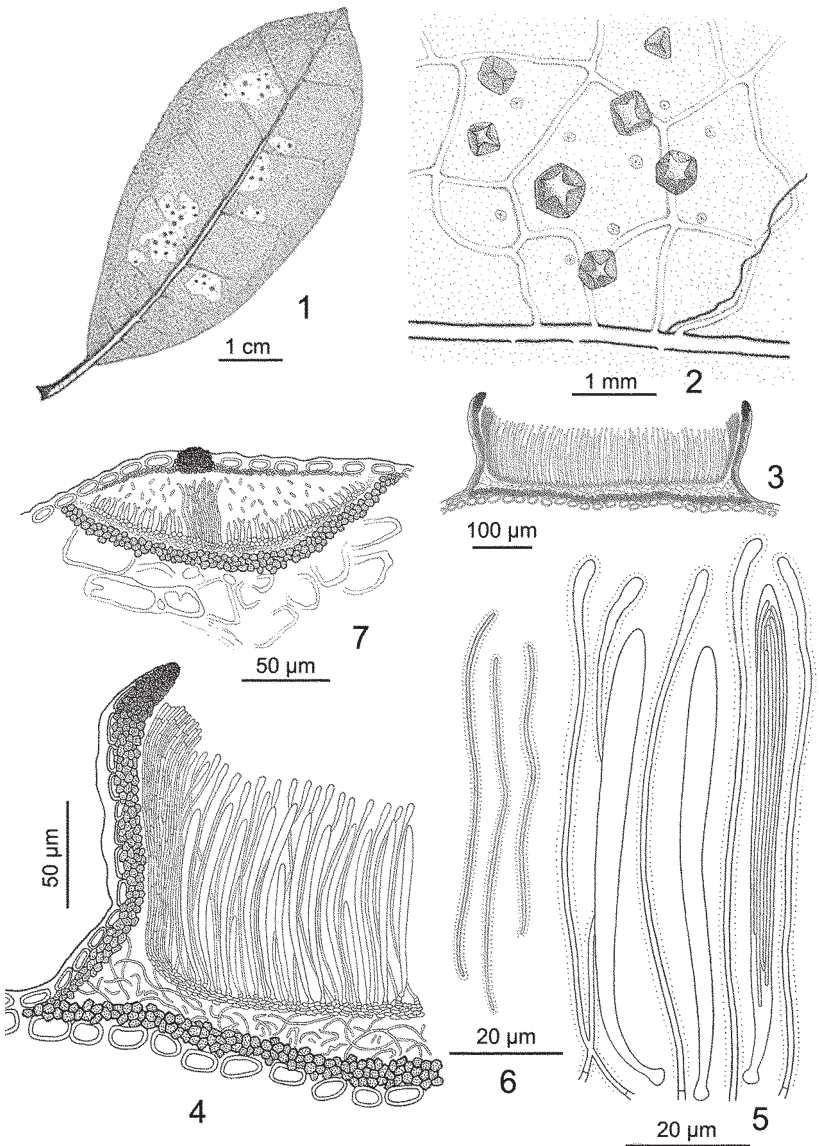
Ascomata amphigena, 300–690 µm, trigona usque ad hexagona, per lacinias 3–6 aperientia, subepidermalia. Cellulae labiorum et periphysoides non visae. Excipulum ex hyphis septatis aliquantum parallelis constatum, apice 20–25 µm crassum. Paraphyses 85–95 × 1.0–1.5 µm, filiformes, ad apicem gradatim ad 2–3 µm incrassatae. Asci in successione maturescentes, 75–88 × 4–5 µm, clavati-cylindrici, brevi-stipitati, J–, 8-spori. Ascosporae 50–72 × 0.8–1.0 µm, filiformes, hyalinae, aseptatae, vagina gelatinosa ca 0.8 µm crassa indutae.

TYPE: China, Anhui, Mt Huangshan, Ciguangge, alt. 730 m, on *Osmanthus fragrans* leaves, 11 Sept. 2007, Y.R. Lin et al. 2227a (Holotype AAUF 68335a).

ETYMOLOGY: *minimus* (Latin = very little, smallest), referring to the size of the ascomata.

ZONE LINES frequent, grey-black or black, thin, entirely or partly surrounding the bleached spots.

CONIDIOMATA developing on both sides of leaves, mostly on the lower side of the leaf, scattered to crowded. In surface view, conidiomata 100–220 µm diam., rotund or slightly irregular, black-brown in the centre and the perimeter line of the conidioma, grey-brown elsewhere, somewhat raising the leaf surface, discharging spores through an apical ostiole. In vertical section, conidiomata subepidermal, more or less double lens-shaped. UPPER WALL poorly developed, dark brown, with indefinite structure. BASAL WALL 8–14 µm thick, black-brown, strongly black and brittle, consisting of 2–3(–4) layers of thick-walled angular cells 3–6 µm diam. SUBCONIDIOGENOUS LAYER 5–7 µm thick, composed of light brown, thin-walled angular cells. TRICHOGYNES 28–36 × 1.5–2 µm, subfiliform, septate. CONIDIOGENOUS CELLS 6.5–12 × 2–3



FIGS. 1–7. *Coccomyces minimus* on *Osmanthus fragrans*. 1. A leaf bearing fruit bodies. 2. Ascomata and conidiomata observed under a dissecting microscope. 3. Ascoma in median vertical section. 4. Detail of ascoma in median vertical section. 5. Paraphyses and asci. 6. Discharged ascospores. 7. Conidioma in vertical section.

μm , flask-shape, holoblastic sympodially proliferating. CONIDIA $3\text{--}5 \times \text{ca } 1 \mu\text{m}$, cylindrical, hyaline, aseptate.

ASCOMATA in similar positions on the host, scattered to crowded in yellow-brown or grey-yellow, irregular bleached spots $5\text{--}12 \text{ mm}$ diam. In surface view, ascomata black-brown to black, slightly shiny, triangular to hexagonal, $300\text{--}690 \mu\text{m}$ diam., strongly raising the substratum surface but depressed in the central area, with an obvious performed dehiscence mechanism, opening by $3\text{--}6$ radial splits, which nearly extend to the edge of ascoma, to expose the waxy-yellow hymenium. Lips not seen. In median vertical section, ascomata subepidermal, $150\text{--}190 \mu\text{m}$ deep. COVERING STROMA $16\text{--}20 \mu\text{m}$ thick near the opening, slightly thinner towards the edge, connecting to the basal stroma, consisting of textura angularis-globulosa with dark brown or black-brown, thick-walled cells $3\text{--}5 \mu\text{m}$ diam. Periphysoids not seen. BASAL STROMA $12\text{--}22 \mu\text{m}$ thick, strongly black and brittle, composed of textura angularis with $2\text{--}3(4)$ layers of black-brown, thick-walled cells $4\text{--}6 \mu\text{m}$ diam. INTERNAL MATRIX OF STROMA well developed, $12\text{--}25 \mu\text{m}$ thick, consisting of hyaline, gelatinised textura intricata. EXCIPULUM arising from the marginal paraphyses, $20\text{--}25 \mu\text{m}$ wide above, becoming thinner towards the base, comprised of rows of hyaline, multi-septate hyphae. SUBHYMENIUM $10\text{--}15 \mu\text{m}$ thick, comprised of hyaline textura angularis-porrecta. PARAPHYSES $85\text{--}95 \times 1.0\text{--}1.5 \mu\text{m}$, filiform, not branched, often gradually swollen to $2\text{--}3 \mu\text{m}$ above, covered with a $\text{ca } 1 \mu\text{m}$ thick gelatinous matrix but not forming an epithecium. ASCI ripening sequentially, $75\text{--}88 \times 4\text{--}5 \mu\text{m}$, cylindrical-clavate, short-stalked, thin-walled, apex round, J-, 8-spored. ASCOSPORES fasciculate, $50\text{--}72 \times 0.8\text{--}1.0 \mu\text{m}$, hyaline, filiform, aseptate, slightly tapered towards the base, covered by a $\text{ca } 0.8 \mu\text{m}$ thick gelatinous sheath.

HOST SPECIES, HABITAT AND DISTRIBUTION: *Osmanthus fragrans*; producing conidiomata and ascomata on fallen leaves. Known only from the type locality, Anhui, China.

COMMENTS—*Coccomyces minimus* resembles *C. cyclobalanopsis* Y.R. Lin & Z.Z. Li in the shape of paraphyses, asci, and ascospores as well as in the color of the exposed hymenium. However, *C. cyclobalanopsis* has larger, intraepidermal ascomata ($400\text{--}900 \mu\text{m}$ diam.) without conidiomata, a thinner basal stroma ($7\text{--}10 \mu\text{m}$ thick), a well-developed subhymenium ($20\text{--}28 \mu\text{m}$ thick), much longer paraphyses ($110\text{--}130 \mu\text{m}$) and asci ($90\text{--}115 \mu\text{m}$), and an upper part of the excipulum $30\text{--}50 \mu\text{m}$ thick arising from inner cells of the covering stroma (Lin et al. 2000).

Coccomyces multangularis Y.R. Lin & Z.Z. Li is easily distinguished from *C. minimus* by its $3\text{--}9$ -sided much larger ($500\text{--}1100 \mu\text{m}$ diam.) ascomata, the $35\text{--}50 \mu\text{m}$ thick upper portion of the excipulum, infrequent periphysoids, and slightly longer asci ($85\text{--}105 \mu\text{m}$) (Lin et al. 2001).

The similar *C. concolor* Sherwood differs in its orbicular ascomata lacking a performed dehiscence mechanism, the covering stroma comprising 1–2 layers of loosely interwoven brown hyphae 2–3 µm diam. that are not black and brittle, the thicker (40–50 µm) excipulum, the swollen (5–6 µm) paraphyses apices, and the much longer asci (80–120 µm) and ascospores (70–100 µm) (Sherwood 1980).

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